

## Seasonal Outlook for Ross Sea and McMurdo Sound 2016-2017

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**ABSTRACT** – *The U.S. National Ice Center issues a yearly seasonal outlook indicating the expected recession pattern for the Ross Sea during the upcoming Austral summer. Ice edges are depicted at 15 day intervals between 15 December and 15 February; the term “ice edge” is used to delineate the boundary between areas with greater than or equal to 4/10ths sea ice and areas with less than 4/10ths sea ice. The predominant purpose of this forecast is to provide the National Science Foundation (NSF) insight for planning scientific and resupply mission support in route to and in McMurdo Sound.*

## INTRODUCTION

The USNIC provides planning and real time operational support for the efforts of the United States Antarctic Program (USAP) through collaboration with NSF. Specifically, this outlook is provided as environmental awareness in order to safely plan for an ice breaking vessel to break the McMurdo/Ross Sea channel and escort an ice-strengthened tanker and an ice-strengthened cargo ship to the pier at McMurdo Station, located at 77°51' S, 166°40' E [1].

In this specific outlook, the term “ice edge” is used to delineate the boundary between areas with greater than or equal to 4/10ths sea ice and areas with less than 4/10ths sea ice.

## METHODOLOGY

### Climatology:

The rates of recession for the Ross Sea ice edge are predominately derived using an analogue forecasting technique that relates historical observations of pre-season ice extent and thickness to the predicted severity of austral summer ice conditions. This analogue data from climatological conditions is adjusted to reflect the expected impact of current meteorological and oceanographic conditions in the Ross Sea.

### Current Conditions:

Based on the USNIC ice analysis for 27 October 2016 the position of the northern ice edge was at a climatological min across the majority of the Ross Sea. Average temperatures slightly above normal could translate into thinner ice than usual.

As of late October 2016, the Ross Sea is covered with thick first year ice (>47”), with a band of old ice between 66°S and 67°S stretching from 163°W to 171°E.

The fast ice along the coast is thick first year ice with up to 4 tenths of old ice embedded within. The fast ice in McMurdo Sound remains mostly old ice. The fast ice extends approximately 16 miles from the center of the turning basin with average ice thickness of 80" (203cm) with several miles on the offshore side appearing to be thinner than the rest. This thinner ice may result in earlier breakup even before Polar Star reaches the fast ice edge.

The atmospheric circulation of the southern high latitudes is dominated by a westerly circumpolar vortex that extends from the surface to the stratosphere, which is called the Antarctic Oscillation (AAO) [2]. The AAO has been in an overall negative phase since the beginning of October indicating a weak westerly flow and Ekman drift transport of water and ice towards the north in the Southern Ocean and Ross Sea [3]. The AAO is forecasted to return to a positive phase during December 2016 before returning to near normal ([http://www.cpc.noaa.gov/products/precip/CWlink/daily\\_ao\\_index/aao/aao.sprd2.gif](http://www.cpc.noaa.gov/products/precip/CWlink/daily_ao_index/aao/aao.sprd2.gif)).

Additional input considered for this outlook includes:

- (a) Surface air temperature
- (b) Sea surface temperatures along the ice edge
- (c) On-site measurements of ice thickness
- (d) Fast ice extent in McMurdo Sound
- (e) Current location of ice edge compared to previous year for same time frame
- (f) Location and concentration of first-year and multi-year ice

## **OUTLOOK**

The Ross Sea in mid-October revealed similarities to ice conditions found in mid-October 2014 and 2015; during this year, the unescorted date was 21 January.

This year's (2016-2017) outlook is for the open water regions to melt with the typical hourglass pattern.

After accounting for a slightly higher than normal air temperatures for the Ross Sea during the Austral Winter, forecasted AAO conditions, and less than the normal amount of old ice, it is projected that the Ross Sea will require icebreaker escort until approximately 21 January 2016. Navigable ice conditions for unescorted vessels (< 4/10) are expected after 23 January 2016.

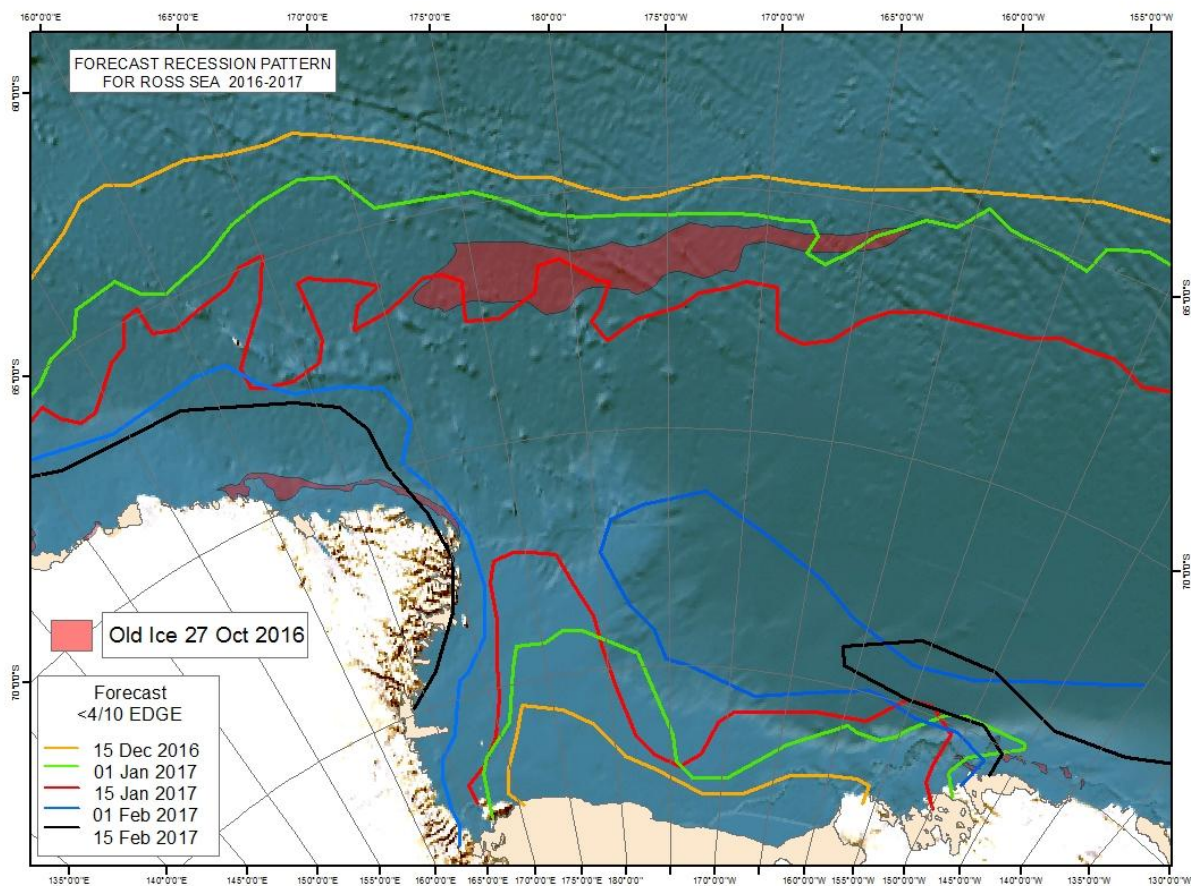


Figure 1. 2016-2017 Ross Sea Ice Edge Recession Outlook ( $\leq 4/10$  ice edge).

As always, there are numerous smaller icebergs scattered throughout the Ross Sea which can pose a hazard to navigation.

Sea ice analyses for the Ross Sea can be obtained via the NIC website at:  
<http://www.natice.noaa.gov>

## REFERENCES

[1] National Science Foundation. *NSF Request for Information No. DCCA-050044; Time Charter Party Agreement for Ice-Breaking Vessel(s) to Assist Re-supply of McMurdo Station, Antarctica.* [http://www.nsf.gov/about/contracting/dcca\\_050044.doc](http://www.nsf.gov/about/contracting/dcca_050044.doc) .

- [2] Thompson, D. W., and J. M. Wallace (2000), Annular modes in extratropical circulation, Part II: Trends, *J. Clim.*, 13, 1018– 1036.
- [3] Liu, J.P., J.A. Curry, and D.G. Martinson, 2004: Interpretation of recent Antarctic sea ice variability. *Geophys. Res. Lett.*, 31, Art. No. L02205